

# PUMPING PLANT

(No.)  
Code 533

Natural Resources Conservation Service  
Conservation Practice Standard

## I. Definition

A pumping facility installed to transfer water for a conservation need.

## II. Purpose

To provide a dependable water source or disposal facility for water management.

## III. Conditions Where Practice Applies

This practice applies wherever water must be pumped to accomplish a conservation objective, which may include but is not limited to one of the following:

- To provide a water supply for such purposes as irrigation, recreation, livestock, or wildlife.
- To maintain critical water levels in swamps, marshes, open water, or for newly constructed wetlands and ponds.
- To transfer wastewater for utilization as part of a waste management system.
- To provide drainage by the removal of surface runoff water or groundwater.

## IV. Federal, State, and Local Laws

Users of this standard should be aware of potentially applicable federal, state and local laws, rules, regulations, or permit requirements governing pumping plants. This standard does not contain the text of federal, state, or local laws.

## V. Criteria

The following criteria apply to all purposes.

### A. General

The efficiency of units, type of power, quality of building, automation features, and other accessories installed shall be in keeping with the economic and environmental value of the system to accomplish the conservation objectives.

Criteria for the design of components not addressed in NRCS practice standards shall be consistent with sound engineering principles.

### B. Capacity

The capacity of the pumping facility shall be adequate for the intended use. Livestock water requirements shall be in accordance with NRCS Field Office Technical Guide (FOTG), Section IV, Standard 614, Watering Facility.

### C. Pump Requirements

The capacities, range of operating lifts, and general class and efficiency of equipment shall be determined by appropriate technical means. The size and number of pumps and their performance shall be determined on the basis of the conservation system requirements in order to meet the intended purpose. The total head shall be determined for critical operating conditions, taking into account all hydraulic losses. Automatic controls shall be included in the plans as required.

Pumps utilized for the transfer of wastewater or manure shall be sized to transfer material at the required system head and flow rate determined by the waste management plan. The pump type shall be based on the consistency of material being pumped and manufacturer's recommendations.

### D. Power Units

Power units shall be selected on the basis of availability of fuel or power costs, operating conditions, conservation needs, and objectives, including the need for automation. The power unit shall be matched to the pump and be capable of operating the pump efficiently and effectively within the range of operating conditions. The horsepower requirements, pump efficiency, and total head on the pump shall be computed.

### E. Hydraulic Rams

Hydraulic rams shall be of a size and capacity which shall meet the minimum pumping rates and volumes at the maximum anticipated total head and shall be installed in accordance with

the manufacturer's recommendations. Adequate bypass facilities shall be provided to prevent erosion or unstable conditions resulting from the hydraulic ram operation.

Backflow prevention shall be incorporated when pumping from wells.

#### **F. Suction and Discharge Pipes**

The size of suction and discharge pipes shall be based on a hydraulic analysis, operating cost, and compatibility with other system components. The arrangement and length of discharge pipe shall be based on the need for recovery of head through siphoning action, and for delivery of water in keeping with conservation and environmental objectives. Gates, valves, pipe connections, discharge bays, and other protective works shall be installed, as needed, for satisfactory plant operation.

#### **G. Building and Accessories**

The design of the pumping plant and associated housing, if required, shall consider the need for protecting equipment from the elements, vandalism and fire, and the accessibility for equipment maintenance and repairs. The appearance of the plant shall be in keeping with its surrounding environment and its importance or value.

Foundations shall be designed to safely support the loads imposed. Sheet piling or other measures shall be used, as required, to prevent piping beneath the foundation.

Pumps may be mounted in the open, on piling, or concrete foundations, in a well or pit, or by other appropriate means.

Suction bays (or sumps) shall be designed to conform to the hydraulic characteristics established by the pump manufacturer.

The discharge bay or connection with distribution system shall be ample to meet hydraulic and structural requirements. Provisions for repair or removal of pumps and engines shall be provided. Trash racks shall be provided, as needed, to exclude debris and trash from the pump.

All structural features and equipment shall provide adequate safety features to protect workers and the public from injury.

### **VI. Considerations**

Additional recommendations relating to design which may enhance the use of, or avoid problems with, this practice, but are not required to ensure its basic conservation function are as follows:

- A. Freezing weather conditions must be considered in the design of the pumping plant.
- B. The minimum water storage needed for livestock systems to satisfy the watering demands in a timely manner.
- C. Effects on downstream flows, aquifer recharge volumes, or existing wetland hydrology.
- D. Effects on surface or groundwater by leaked or spilled fuels and lubricants.

### **VII. Plans and Specifications**

Plans and specifications for constructing pumping plants shall be in keeping with this standard and shall describe the requirements for properly installing the practice to achieve its intended purpose.

### **VIII. Operation and Maintenance**

An Operation and Maintenance plan specific to the facilities installed shall be prepared for use by the landowner or responsible operator. The plan shall provide specific instructions for operating and maintaining facilities to ensure the pumping plant functions properly. The plan shall include provisions to address the following, as a minimum:

- A. Inspection or testing of all pumping plant components, appurtenances, safety features, and secondary containment facilities as applicable.
- B. Proper start-up procedures for the operation of the pumping plant.
- C. Routine maintenance of all mechanical components (power unit, pump, drive train, etc.) in accordance with the manufacturer's recommendations.
- D. When applicable, the power unit, fuel storage facilities and fuel lines should be frequently checked for fuel or lubricant leaks and repaired as needed.

- E. Periodic checks and removal of debris as necessary from trash racks and structures to assure adequate capacity reaches the pumping plant.
- F. Periodic removal of sediment in suction bays to maintain design capacity and efficiency.
- G. Inspect and maintain anti-siphon devices, if applicable.
- H. Routinely test and inspect all automation components of the pumping plant to assure they are functioning as designed.
- I. Inspect and maintain secondary containment facilities, if applicable.

## **IX. References**

USDA, NRCS Wisconsin Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications.